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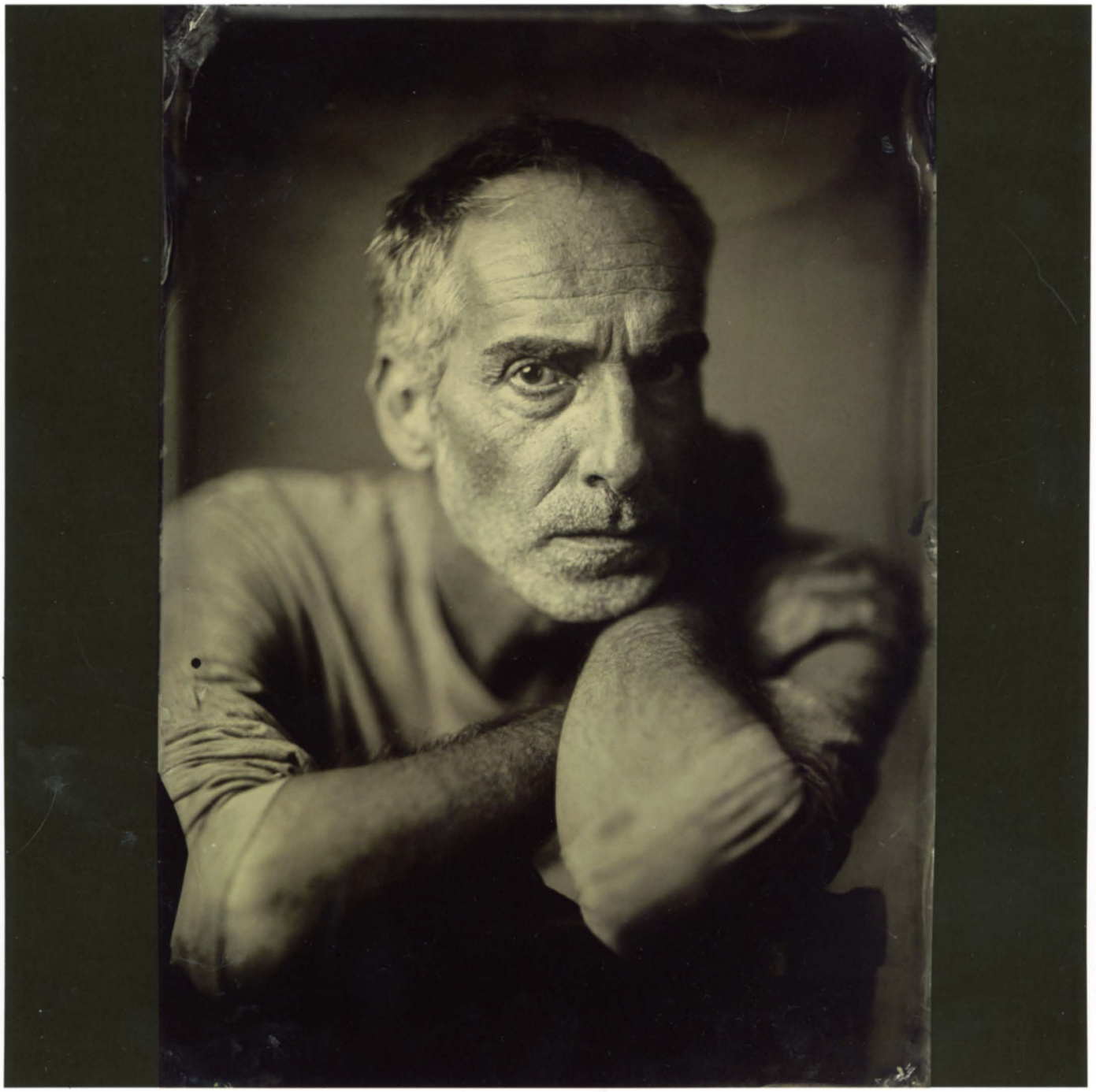

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The (Hi)Story of Photo Paper

By Lina Bessanova

In the beginning,

there was silver chloride. Egg whites were manually separated, whisked, and fermented, then used to bind the silver coating to the finest quality sheets of albumen paper. In the 1870s, this process took place in the world's centers of albumen paper production: Dresden, Germany and New York, USA. Now, photographers no longer needed to sensitize the pre-coated papers themselves as they had been doing for the past twenty years, and were also saved from silver-stained fingers. Printing became increasingly common, especially since nothing much apart from daylight and a contact printing device was needed: albumen was a printing-out-paper (POP, a term later coined by Ilford), on which one could see the darkening under the negative and simply wash and fix at the right moment.

At about the same time, in the late 1850s, wet plate collodion was undergoing amateur-friendly changes too, transforming into commercially coated dry plates. Numerous photographers and scientists had tried adding everything from glycerin to honey and coffee into the wet collodion mix.

The first manufactured dry plates in the 1860s had the more sensitive silver bromide, instead of iodide, added to collodion. This mix still left them three times slower than wet plate, but qualified for the first really user-friendly photographic emulsion. The unhealthy fumes of the collodion mixture led R. L. Maddox to replace the binding substance entirely with gelatin.

Maddox never marketed his new product, which needed hardening, but by 1874 the Liverpool Dry Plate company was selling hardened gelatin bromide plates. Then, in 1877, ripening was discovered: the longer the emulsion was heated, the more sensitive it became. It was then cooled, cut, had the excess silver nitrate washed away, melted again, and finally the emulsion was applied with extra gelatin onto dry plates. After the emulsion stiffened, it was dried in a dark room and packed. Among numerous other now-forgotten dry plate manufacturing companies were the beginnings of the Kodak, Adox, and Ilford concerns.

Meanwhile, gelatin-based emulsions also started to be used for printing, and the first component to be replaced was egg white. Although collodion had been used successfully, gelatin mixed with citric acid was less toxic, stored well, didn't turn yellow, and withstood temperature changes and humidity, too. Silver chloride was too slow for negatives but perfect for printing, where longer times are often appropriate. And, as with all POP papers, no darkroom or developer was needed.

In 1884, E. Obernetter, who had been making collodion papers since the 1860s, started large-scale production of gelatin chloride paper in Munich. He also introduced the baryta layer, which prevented the emulsion from soaking into the paper fibers and could be used for creating various textures. Dr. Liesegang from Dusseldorf was the next to produce these papers and brought them to the market under the 'Aristotype' name, always carefully noting that the gelatin paper produces an image "exactly like albumen."

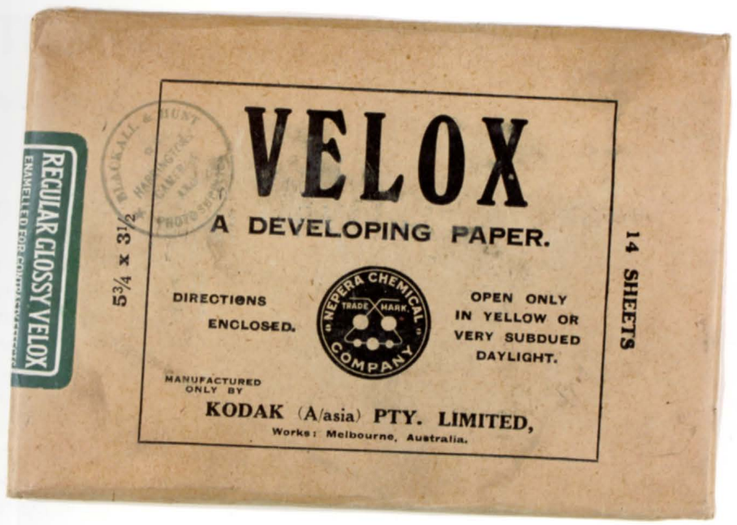
Throughout the 1880s,

paper production technology advanced quickly. Manufacturers started installing automated coating machines, which were able to spread emulsions evenly over the paper surface. A baryta layer and new finishes became the norm by 1890, and components in the emulsions were varied to create different colors. Many of these were the so-called "self-toning" papers like Ilford "Hyptona," which had toner included in the emulsion. The binders used in POP papers varied from region to region, with gelatin being more popular in Europe, and collodion having the biggest market share in USA and North America.

Ilford "P.O.P." and Kodak "Solio P.O.P." were among the most successful. Kodak discontinued its last "Studio Proof" POP in 1987, but Kentmere kept making a similar paper until 2007, when it was acquired by Ilford and production was shut down.

The story of developing-out papers (DOP) was an interesting one: similar to dry plates, the gelatin bromide emulsion was coated on paper and offered such high speed that it was impossible to use outside a special darkroom.

The discovery of spectral sensitizers by Agfa employee H. W. Vogel made emulsions sensitive to more than UV and blue light, which meant that papers could be exposed (and fogged) indoors too, and required a red safelight. The solution was too far ahead of its time - there was not much consumer need for enlargements from the already big glass negatives, and amateurs were put off by the complexity. Printing by simple visual assessment was no longer possible, mechanical timers didn't work precisely, and every manufacturer had its own paper sensitivity.



Luckily, G. Eastman happened upon "Velox" by Nepera. This developing-out paper was based on a silver chloride emulsion, which was so much slower than silver bromide that it could withstand handling in subdued room light without fogging, but still claimed to be "500x faster than albumen papers." He bought the rights from L.H. Baekeland, a Belgian chemist, for the tidy sum of almost 1 million dollars. The deal, however, prohibited Baekeland from doing any photo-related research for twenty years. Many years later, a very upset chemist named J.M. Eder surfaced, claiming that he and G. Pizzighelli had invented gelatino-chloride DOP paper in 1881.

This seemed true at first glance, but Baekeland's process showed considerable production differences and was much better suited for mass manufacturing.

The same upset chemist was also the first to mix silver chloride (fine grain, slow speed, warm tone) and silver bromide (big grain, high speed, cool tone) emulsions together. He introduced the results as his "Alpha" paper in the 1890s. Later, many 20th century papers were manufactured using a chlorobromide compound, which offered extremely varied characteristics and beautiful reactions to toners.

"Velox" gave birth to a whole range of papers: Artura "Iris", Gevaert "Ridax" and Ilford "Selo" to name a few.

An Ansco "Cyko" manual from the 1910s shows two ladies in elegant dresses sitting at a round table, exposing a contact printing frame to gas lamp light. After a 5 to 12 second exposure, according to the manual, they could go into a darker room corner, or turn down the lamp light, and develop their print. The "gaslight" papers only allowed contact printing and were an obvious step back in analog evolution; however, amateurs loved them. A Kosmos product, NoVex, stood for "New Gaslight Paper - No Vexing Difficulties" and that is what it delivered. Kodak "Azo" was a bestselling, high-quality, contact printing pure gelatino-chloride paper which lasted into the next century. Since the discontinuation of Fomalux, Adox Lupex (Lodima) is one of few, if not the only, emulsion of this type existing to this day.

By the end of the century,

compact cameras and smaller format roll film came to be more prevalent, thus making enlargements almost necessary. Enlargers of adequate sizes became available too, and the previously disregarded bromide paper turned out to be extremely useful for its sensitivity. The golden age of darkroom printing and paper production lasted until WWII, when hundreds of combinations of grades, finishes, colors, and textures were available. One could choose something as exotic as a "smooth high lustre old ivory" or "silk matte white" to support an artistic vision.

New factories were popping up in the new markets of the world: Fujifilm and Oriental in Japan, Fotochema (now Foma) in the Czech Republic, Forte in Hungary, Fotokemika in Croatia, Slavich in Russia, Lucky in China, Ferrania in Italy, and Hindustan Photo Film Manufacturing Company in India. Meanwhile, early in the 20th century, companies were consolidating. Kodak bought several independent companies including Artura and Vitava, keeping their brands.

In 1928, Agfa merged with Ansco, Defender's product line was incorporated into Du Pont in the 1940's, and Anken took over Dassonville. However, Ilford refused to merge with Kodak. Small Western manufacturers found themselves in a highly competitive mass market, and a lot of them went out of business.

The last and biggest revolution in paper production came in the form of variable contrast technology, where the paper has both soft- and hard-contrast emulsions, reacting to green or blue light. The first published papers on this possibility date back to the 1910s, but it was only in 1940 that it came to market. Two companies, Ilford in England and DuPont in the USA simultaneously released their Multigrade and Varigam variable-contrast papers with a set of filters. It wasn't until the 1980s that MG technology became widespread. Soon, in addition to Ilford and DuPont, Haloid, Agfa, Kodak, Oriental, Foma, Forte, and other smaller brands were offering "all grades on one paper."

During first the color and then the digital revolutions, advanced multigrade paper was an important product for the amateur consumers who were still making prints themselves as many professionals moved to digital.

And so, with time, most companies demolished their paper production facilities. The only paper manufacturing plants known to remain are in the UK (Harman technology trading as Ilford Photo), the Czech Republic (Foma Bohemia), Japan (Fujifilm, color only), USA (Kodak, color paper only), Russia (Slavich), and Switzerland (Adox). Foma and Ilford are coating the highest volume of paper in the world, but the smaller German company, Adox, is looking to the future by investing all profits into research and a new coating facility. The Polywarmtone project— reworking the old Forte recipe with the latest Agfa technologies— took ten years to complete and will finally be released soon.

With the analog community excited about the release of the Polywarmtone paper, and interest in darkroom printing in general showing healthy growth, the future of paper looks bright again.